



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BTAC, Y2S1

ACH4202 : INTRODUCTION TO INSTRUMENTATION 1

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: Pick Date Select Month Pick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Answer question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question one

- Name eight instrumental methods and the analytical signal they are based upon. (8 marks)
- Differentiate between the on-line mode and the in-line mode of analytical computerized instruments. (10 marks)
- List six criteria of instruments that can be used to decide whether an instrumental method is suitable for the analytical problem. (6 marks)
- Name four classical analytical methods. (6 marks)

Question two

- Explain four ways in which the laboratory information management systems (LIMS) is useful in management of data. (8 marks)
- Discuss briefly the following terms:
 - Local area network (LAN)

- (ii) Wide area network (WAN) (8 marks)
- c) Briefly discuss:
 - (i) Input transducers
 - (ii) Output transducers. (4 marks)

Question three

- a) In digital circuits, there are three basic logic gates AND, OR and NOT. Give logic symbols and truth tables for two logic gates. (10 marks)
- b) Discuss the following methods of reducing noise:
 - (i) Modulation/demodulation
 - (ii) Boxcar averaging
 - (iii) Smoothing
 - (iv) Integration (10 marks)

Question four

- a)
 - (i) What is the student's t?
 - (ii) What is the confidence interval? Give the formula. (9 marks)
- b) In replicate analysis, the carbohydrate content of a glycoprotein is found to be 12.6, 11.9, 13.0, 12.7 and 12.5g of carbohydrate per 100g of protein. Find the 90% confidence interval for the carbohydrate content. (11 marks)

Question five

- a) A dye solution is continuously flowed through the flow cell of a spectrophotometric detector and recorded absorbance is 0.986. the same dye solution is injected into the carrier stream using a 25.0 ul injection loop, and maximum absorbance of resulting FIA peak is 0.327.
What is:
 - (i) The dispersion coefficient
 - (ii) The $S_{1/2}$ value (11 marks)
- b) Briefly discuss the three primary parts of a control loop in continuous process control instruments. (9 marks)